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Sperry, R. W. (1952) Regulative factors in the orderly growth of neural circuits. *Bio.Abs.*26(2), 1962.

AUTHOR'S ABSTRACT

SPERRY, R. W. (U. Chicago) / Regulative factors in the orderly growth of neural circuits. / Growth / 10: 63-87. 12 fig. 1952.--A theory of the ontogenetic patterning of central nervous pathways is presented in its initial rough outlines with supporting evidence drawn from numerous experiments dealing with the development and regeneration of synaptic connections in the lower vertebrates. It is shown that nerve cells form their functional interrelations in orderly predetermined patterns under conditions where the organization cannot be ascribed to experiential factors nor to a purely mechanical guidance of fibers to their proper terminals. The findings indicate that the synaptic associations are laid down in the nerve centers in a precise and highly selective manner regulated by specific chemical affinities between the advancing fiber tips and the various neuronal elements which they encounter. Apparently the nervous system undergoes a highly refined differentiation that in many nuclei approaches the level of the individual neuron. Additional specificity is induced via terminal fiber contacts. Individual neurons must typically be stamped with several qualitatively different dimensions of chemical specificity each of which is extended without dilution or alteration throughout the finest dendritic and axonal arborizations. That these genetically determined patterns of chemical specificity lead to the growth of complex neural circuits perfectly predesigned for adaptive function may be ascribed to evolutionary selection as in other organ systems.--R. W. Sperry